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Quantum renormalization of the spin Hall effect. BO GU, Tohoku Univ., JING-YU GAN, CAS, NEJAT BULUT, Tohoku Univ., TIMOTHY ZIMAN, ILL, GUANG-YU GUO, Nat. Taiwan Univ., NAOTO NAGAOSA, Univ. of Tokyo, SADAMICHI MAEKAWA, Tohoku Univ. — Here we show, by a combined approach of density functional theory and quantum Monte Carlo simulation, that the Fe impurity in Au host metal, a historic Kondo system, shows an important new aspect of Kondo effect, i.e., a surprising role to enhance the relativistic spin-orbit interaction. The spin-orbit interaction, with the bare value of tens of meV, is tremendously enhanced, competing with the hybridization energy of the order of eV, leading to a gigantic spin Hall angle comparable to that observed in recent experiment. More generally we can, for the first time, quantify an essential difference between the anomalous Hall effect and the spin Hall effect.

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